WHAT IS CLAIMED IS:

1. A system for neutralizing airborne pathogens, comprising:

A. a flow-through reaction chamber having:

1. a chamber air inlet at a first end of the reaction chamber to admit air contaminated with pathogens, and

2. a chamber air outlet at a second end of the reaction chamber to release decontaminated air, and defining between the air inlet and air outlet a passageway,

B. a supply of aqueous hydrogen peroxide connected to a conduit for introducing aqueous hydrogen peroxide into the reaction chamber, and

C. an ultraviolet light source for introducing UV light into the reaction chamber.

2. The system as in claim 1, wherein the supply of aqueous hydrogen peroxide is a hydrogen peroxide generator connected to a water supply and a source of electricity.

3. The system as in claim 1, wherein the supply of aqueous hydrogen peroxide is a reservoir of aqueous hydrogen peroxide.

4. The system as in claim 1, wherein the conduit is a nozzle disposed inside the reaction chamber.

5. The system as in claim 1, wherein the reaction chamber further comprises a porous matrix.

6. The system as in claim 5, wherein the porous matrix is metal foam.

7. The system as in claim 6, wherein the metal is selected from the group comprising aluminum, copper, silver, and oxides thereof.

8. The system as in claim 6, wherein the metal foam is aluminum foam.

9. The system as in claim 5, wherein the porous matrix is removable.

10. The system as in claim 1, further comprising a microwave generator to introduce microwaves into the reaction chamber.

11. The system as in claim 1, further comprising an ultrasonic wave generator to introduce ultrasonic waves into the reaction chamber.

12. The system as in claim 1, further comprising an ozone supply for introducing ozone into the reaction chamber.

13. The system as in claim 12, wherein the ozone supply is an ozone generator.

14. The system as in claim 12, wherein the ozone supply is a reservoir that contains ozone.

15. The system of claim 12, further comprising a mixing chamber for mixing ozone and aqueous hydrogen peroxide.

16. The system of claim 1, wherein the reaction chamber further comprises a solid support.

17. The system of claim 16, wherein the solid support comprises ozone removal catalysts.

18. The system of claim 16, wherein the solid support comprises compounds that adsorb or neutralize pathogens.

19. The system of claim 16, wherein the solid support comprises compounds that adsorb or neutralize chemical toxins.

20. The system of claim 19, wherein the solid support comprises ozone removal catalysts.

21. The system of claim 17, wherein the ozone removal catalyst is a member selected from the group comprising all-aluminum catalysts, a carbon supported metal oxide catalyst, $CuCl_2$-coated carbon fibers, carbon-iron aerosol particles, alumina, platinum, palladium, and nickel.

22. The system of claim 13, wherein the ozone generator is a corona discharge generator.

23. The system as in claim 1, configured for operation in a continuous mode.

24. The system as in claim 1, configured to be activated upon demand.

25. The system of claim 1, further comprising a fan to move air through the passageway.

26. The system of claim 1, wherein an amount of hydrogen peroxide in the reaction chamber is controlled by sensors.

27. The system as in claim 1, wherein the ultraviolet light source emits high intensity UV light.

28. The system as in claim 27, wherein the ultraviolet light source emits UV light having a wavelength in a range from about 250 nanometers to about 300 nanometers.

29. The system of claim 1, wherein a concentration of hydrogen peroxide in the aqueous hydrogen peroxide supply is from about 1 % to about 50%.

30. The system as in claim 1, wherein a concentration of hydrogen peroxide in the aqueous hydrogen peroxide supply is from about 1 % to about 25%.

31. A method of neutralizing airborne pathogens comprising:

1. introducing air contaminated with pathogens into a flow-through reaction chamber;

2. introducing aqueous hydrogen peroxide into the flow-through reaction chamber to form a mixture of contaminated air and aqueous hydrogen peroxide inside the reaction chamber;
3. irradiating the mixture with ultraviolet light thereby neutralizing the airborne pathogens to create decontaminated air; and
4. releasing the decontaminated air from the reaction chamber.

32. The method of claim 31, further comprising the additional step before step 3 of introducing ozone into the reaction chamber forming a mixture of contaminated air, aqueous hydrogen peroxide and ozone.

33. The method of claim 31, step 2 further comprising mixing the aqueous hydrogen peroxide with ozone before introducing the aqueous hydrogen peroxide to form a mixture of contaminated air, aqueous hydrogen peroxide and ozone.

34. The method of claim 31, step 2 further comprising introducing the aqueous hydrogen peroxide into the reaction chamber through a nozzle disposed in the reaction chamber, to form at least one of a spray, mist or vapor.

35. The method as in claim 31, step 2 further comprising maintaining a concentration of hydrogen peroxide in the flow through reaction chamber at a level in a range from about 1% to about 50%.

36. The system as in claim 31, step 2 further comprising maintaining a concentration of hydrogen peroxide in the flow-through reaction chamber at a level in a range from about 1% to about 25%.

37. The method as in claim 32, step 2 further comprising maintaining a concentration of ozone in the reaction chamber at a level in a range from about 0.01 ppm to about 100 ppm.

38. A method of neutralizing airborne chemical toxins comprising:
    1. introducing air contaminated with chemical toxins into a flow-through reaction chamber;
    2. introducing aqueous hydrogen peroxide into the flow-through reaction chamber to form a mixture of contaminated air and aqueous hydrogen peroxide inside the reaction chamber;
    3. irradiating the mixture with ultraviolet light thereby neutralizing the airborne chemical toxins to create decontaminated air; and
    4. releasing the decontaminated air from the reaction chamber.

39. The method of claim 38, further comprising the additional step before step 3 of introducing ozone into the reaction chamber to form a mixture of contaminated air, aqueous hydrogen peroxide and ozone.

40. The method of claim 38, step 2 further comprising mixing the aqueous hydrogen peroxide with ozone before introducing the aqueous hydrogen peroxide to form a mixture of contaminated air, aqueous hydrogen peroxide and ozone.

41. The method of claim 38, step 2 further comprising introducing the aqueous hydrogen peroxide into the reaction chamber through a nozzle to form at least one of a spray, mist or vapor.

42. The method as in claim 38, step 2 further comprising maintaining a concentration of hydrogen peroxide in the flow through reaction chamber at a level in a range from about 1% to about 50%.

43. The system as in claim 38, step 2 further comprising maintaining a concentration of hydrogen peroxide in the flow-through reaction chamber at a level in a range from about 1% to about 25%.

44. The method as in claim 32 or claim 33, step 2 further comprising maintaining a concentration of ozone in the reaction chamber at a level in a range from about 0.01 ppm to about 1000 ppm.

45. The method as in claim 32 or claim 33, step 2 further comprising maintaining a concentration of ozone in the reaction chamber at a level in a range from about 0.01 ppm to about 1000 ppm.

46. A system for neutralizing airborne pathogens and chemical toxins, comprising:

A. a flow-through reaction chamber having:

1. a chamber air inlet at a first end of the reaction chamber to admit air contaminated with pathogens, and

3. a chamber air outlet at a second end of the reaction chamber to release decontaminated air, and defining between the air inlet and air outlet a passageway,

B. a supply of aqueous hydrogen peroxide connected to a conduit for introducing aqueous hydrogen peroxide into the reaction chamber, and

C. a means for converting aqueous hydrogen peroxide to hydroxyl radicals.

47. The system as in claim 46, wherein the means for converting aqueous hydrogen peroxide into hydroxyl radicals is heat.

48. The system as in claim 46, wherein the means for converting aqueous hydrogen peroxide into hydroxyl radicals is electricity.